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**United States Patent** [19]

Yoshimoto et al.

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- [54] **LIQUID CRYSTAL DISPLAY DEVICE  
SUBSTANTIALLY FREE FROM  
CROSS-TALK HAVING VARISTOR LAYERS  
COUPLED TO SIGNAL LINES AND  
PICTURE ELECTRODES**

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- [30] **Foreign Application Priority Data**

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- [51] **Int. Cl.<sup>5</sup>** ..... G02F 1/133

- [52] **U.S. Cl.** ..... 359/58; 359/57;  
359/51; 359/79; 359/87; 340/784

- [58] **Field of Search** ..... 350/333, 332, 334, 336,  
350/339 R, 331 R; 340/784

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[57] **ABSTRACT**

A liquid crystal display device capable of displaying clear images without cross-talk, comprises (a) a first transparent base, (b) a plurality of picture element electrodes on the first base (a), (c) a plurality of signal lines on the first base (a), (d) a plurality of varistor layers connecting the picture element electrodes (b) to the signal lines (c) therethrough, (e) a second transparent base in parallel to the first base (a), (f) a plurality of electrodes on the second base (e), and (g) a liquid crystal material layer arranged between the picture element electrodes (b) and the electrode (f), and is characterized in that portions of the varistor layer connecting the signal lines (c) and the adjacent picture element electrode (b) have a threshold value voltage ( $V_{th}$ ) smaller than a minimum voltage ( $V_{min}$ ) at which an electric current is allowed to flow from the signal lines (c) to the electrodes (f) through at least portions of the varistor layers extending from the signal lines (c) toward the electrodes (f).

15 Claims, 3 Drawing Sheets

